State of Iowa - Return on Investment Program / IT Project Evaluation

SECTION 1: PROPOSAL

Tracking Number (For Project Office Use)

Project Name: Completion of ATM / MPEG-2 migration (Phase 3) Da

Agency Point of Contact for Project: Harold (Tommy) Thompson

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Executive Sponsor (Agency Director or Designee) Signature: _____

Is this project necessary for compliance with a Federal standard, initiative, or statute? (If "Yes," cite specific requirement, attach copy of requirement, and explain in Proposal Summary)	❑ Yes	❑ No
Is this project required by State statute? (If "Yes," explain in Proposal Summary) Authorized by House File 762(18)m	❑ Yes	❑ No
Does this project meet a health, safety or security requirement? (If "Yes," explain in Proposal Summary)	❑ Yes	❑ No
Is this project necessary for compliance with an enterprise technology standard? (If "Yes," explain in Proposal Summary)	❑ Yes	❑ No
Does this project contribute to meeting a strategic goal of government? (If "Yes," explain in Proposal Summary)	❑ Yes	❑ No
Is this a "research and development" project? (If "Yes," explain in Proposal Summary)	❑ Yes	❑ No

PROPOSAL SUMMARY:

In written detail, explain why the project is being undertaken and the results that are expected. This includes, but is not limited to, the following:

1. A pre-project (before implementation) and a post-project (after implementation) description of the system or process that will be impacted.

   Pre-project: In 1999, the ICN presented two options to the Legislative Oversight Committee for meeting the needs of its authorized users: (1) expansion of the current Network design or (2) upgrading the Network to Asynchronous Transfer Mode (ATM) technology. The Legislature authorized the ICN to move forward with the upgrade of the Network's video technology to MPEG-2 and, at the same time, incorporate ATM technology into the Network backbone. House File 762(18)m appropriated $4,000,000 to the ICN to either replace existing optical components of the Network or convert to new technology components. It also appropriated $5,000,000 from the Part 3 contract to purchase and install ATM / MPEG-2 equipment in the remaining Part 3 sites, rather than installing DS-3 equipment. Completion of these legislative mandates assures the ICN will be able to accommodate the connectivity demands of current and projected users, provide

dependable service, and use equipment meeting the standards of the International Telecommunications Union.

In FY 2000, a total of $9,000,000 was spent in Phase One of this multi-year strategy. These dollars were used to purchase the ATM switches and software for the entire conversion and to complete the first ring of the upgrade, located in the southwestern portion of the State, which became operational in May 2000. It also secured the ATM Cellworx equipment for the northwest and southeast Iowa rings.

In FY 2001, The ICN requested $7,000,000 to continue with Phase Two of the ATM conversion. While all $7,00,000 was appropriated only $3,500,000 of this request has been funded. These dollars purchased the codecs for the ring in northwest Iowa. A codec is necessary to encode/decode the video signal in the classrooms. The remaining $3,500,000 was to have secured the MPEG-2 codecs for the southeast Iowa ring.

Currently, the Network is a mixed technology platform. A gateway has been constructed to "patch" these platforms together and to act as a translator between the DS3 and ATM/MPEG-2 networks. Sixty of the codecs are being used to create that gateway. This gateway was built as a temporary measure during the conversion process and cannot operate as a long-term solution. Transmissions that must use the gateway suffer from problems such as latency and voice disruptions. Customers will tolerate short-term inconveniences but expect the high quality video services to return. In addition, the Network is now at full capacity creating a shortage of capacity in eastern Iowa.

The ICN must now increase its request from $7,000,000 to $10,500,000 to complete the final phase of the conversion to ATM/MPEG-2 technology started by the Legislature in 1999. Completion of the conversion will allow the Network to meet the current bandwidth needs of eastern Iowa and to accommodate increased bandwidth needs for future initiatives. The requested $10,500,000 will purchase the remaining MPEG-2 codecs and the Cellworx equipment necessary for the remaining rings in southeast, north central, and northeast Iowa.

Contribution to meeting a strategic goal of government:

Chapter 8D of the Iowa Code states…

8D.3.1 The Iowa Telecommunications and Technology Commission (ITTC) shall ensure that the Network operates in an efficient and responsible manner providing the best economic service attainable… The Commission shall ensure that educational users, and the use, design, and implementation for educational applications be given the highest priority concerning the use of the Network.

8D.13.7 The final design selected shall optimize the routing for all users in order to assure maximum utilization by all agencies of the State.

Post-Project: This project request is for the funds necessary to complete the deployment of the ICN's migration to ATM/MPEG-2. This area includes the University of Iowa, University of Northern Iowa, and Des Moines Area Community College. Some of the cities affected are Waterloo, Mason City, Ankeny, and Marshalltown. The region covered by this ring currently serves 443 classrooms. Portions of these regions already have ATM equipment in place, which currently cannot be utilized until codecs are installed. The ICN has no funds to purchase the remaining codecs.

The problems associated with using obsolete DS-3 technology have become critical in the eastern half of Iowa. Spare parts are not available from vendors and failure rates are escalating due to the age of the equipment. Delaying the conversion further reduces the number of spare

parts available for repairing the Network. Completion of the conversion will eliminate this problem.

Once the conversion is completed, the long-term compatibility issues between the DS-3 and ATM/MEPG2 portions of the Network will be eliminated. High quality will be restored to video customers. There will be no need to support and maintain two different technology platforms.

2. A summary of the extent to which the project provides tangible and intangible benefits to either Iowa citizens or to State government. Included would be such items as qualifying for additional matching funds, improving the quality of life, reducing the government hassle factor, providing enhanced services, improving work processes, complying with enterprise technology standards, meeting a strategic goal, avoiding the loss of matching funds, avoiding program penalties/sanctions or interest charges, avoiding risks to health/security/safety, complying with federal or state laws, etc.

   Direct Impact on Citizens: All ICN authorized users (and their customers) will benefit from this upgrade of the Network. Examples of these benefits include:

   - Improving work processes in state and federal government departments and agencies through reliable high-speed data transfers. Cost saving programs such as tele-justice will directly benefit from reliable, high quality video connections. Meetings held over the ICN reduce travel time for both State employees and citizens of the State while allowing employees to accomplish more in less time. Government use of the ICN services, whether at the state or national level, promotes efficiency, saves money, and makes government services more readily available to Iowans no matter where they live. This infrastructure is the essential link in connecting Iowans with state government.

   - Improving the quality of life for educational users (Public and Private K-12 institutions, Community Colleges, Area Education Agencies, Regent Institutions, Private Colleges and Universities) by providing high quality, affordable video services for distance learning. In many instances this is the only way a student may have the opportunity to take an advanced level class.

   - Improving the quality of life for citizens in rural communities who can access medical expertise through telemedicine sites at their local public hospitals. Reliable connections are essential in emergency situations. These video capabilities also allow medical staff to access training and keep current in their fields.

   Benefit to the State Government Enterprise: All agencies of State government utilize the ICN's services in their daily operations. State agencies depend on high speed, high quality communications provided by the ICN's voice, data, and video services. The ICN's video service provides huge savings to State agencies. In FY 2001, State agencies pay $7.00 per hour for training use and $12.75 per hour for administrative use for video service, compared to an average of over $180.00 per hour charged by other telecommunication providers. The essential voice and data services are competitively priced for State government enterprise usage. Maintaining the reliability of Iowa's communication network will benefit all areas of State government.

   Compliance with an enterprise technology standard: With this upgrade the ICN meets telecommunication industry technology standards for video. MCI, Sprint, AT&T, and other long distance carriers are upgrading their backbone networks to ATM technology that will support MPEG-2 video protocol. The transition to standards-based video technology will allow users in Iowa to interface with out-of-state users on full-motion video connections.

   The State has equipment installed on the Network that cannot be used. This a great loss to the citizens of Iowa, not only as a failure to capitalize on the investment already made, but also as a

decrease in the availability and reliability of services. The completion of this project will bring the entire network to the same technology standard, eliminating the need to support the DS-3 platform.

Contribution to meeting a strategic goal of government: Chapter 8D Code of Iowa, created the ICN to provide equal educational resources to all Iowans. The current level of use of the Network's services has exceeded the Network's capacity and the Network's optical equipment is at the end of its life span. This leads to rationing of services and increased outages. Completing the conversion to ATM/MPEG-2 increases the efficiency of the Network services through more effective use of bandwidth. Together, these technologies help the ICN fulfill the purpose for which it was created. The ATM/MPEG-2 conversion supports the Governor's education initiative. If any new initiatives requiring expanded bandwidth are mandated, the necessary bandwidth is currently not available in the eastern half of Iowa. Completion of the conversion will remedy this situation.

3. A summary that identifies the project stakeholders and how they are impacted by the project.

Risk: Currently the fiber optic network is operating with a moderate risk factor due to the age of the optic equipment, shortage of replacement parts, and increasing equipment failure occurrences. If the conversion is not completed in FY 2002 this factor dramatically increases to very high risk. Based upon escalating equipment failure rates, the ICN will not have the spare parts for repairs should this upgrade extend into FY 2003. Voice, Data, and Video services will all be adversely affected in quality and reliability and it is very possible existing users will lose current levels of service at some locations on the Network.

Intangible return on investment: The State of Iowa has invested $350,000,000 in the backbone infrastructure of the Network. Failure to complete the ATM/MPEG-2 conversion in FY 2002 prevents the citizens of the State of Iowa from realizing the return on their investment in the Network. Delaying any portion of this project into FY 2003 will require the ICN to proceed with upgrades costing an additional $4,343,654 to keep the old DS-3 portion of the Network running until the conversion is completed. The ICN has managed to delay these upgrades through the first two phases of the conversion. The Network has run out of capacity in the unconverted sections of the State and the State will have to proceed with these upgrades to provide service to those authorized users.

Improvement in customer service: Video reliability has decreased in the old DS-3 portion of the Network from 99.9% in FY 2000 to 95% in FY 2001. The DS-3 codecs are already one to two years beyond their useful life. Failure rates in this portion of the Network are increasing at an alarming rate. Replacement equipment is no longer manufactured. Repairs must be made with old equipment removed from the converted portion of the Network. With the increased failure rates and unavailability of replacement equipment, the ICN is rapidly approaching a point where it will not be able to maintain operation of those DS-3 classrooms that fail in the unconverted areas of the Network. The completion of the Network will ensure that authorized users continue to receive the highest-quality interactive video, Internet, and long distance voice services. But the upgrade is also a significant achievement for all Iowans, creating greater learning opportunities and access to essential services in the areas of education, government, justice, and health.

In FY 2001, operation of the Network using the mixed technology platforms presents a moderate risk factor. Most of the DS-3 equipment in operation is currently seven to eight years old. The manufacturers projected equipment life is seven years. As the equipment ages, we are experiencing more equipment failures. The DS-3 codecs are no longer manufactured. Old DS-3 equipment from the converted areas is currently used for repair parts as failures occur. As failure rates increase and repair parts are used up, the ICN's supply of old DS-3 equipment parts will be depleted.

If the conversion is not completed in FY 2002, the Network will be in high risk. The ICN made a conscientious cost avoidance decision not to upgrade the systems in the old DS-3 environment,

which will be replaced. This decision was made with the assumption the project would stay on schedule. This upgrade can no longer be avoided if the full $10,500,000 cannot be provided in FY 2002. The cost of this upgrade is $4,343,654. The Network currently is at full capacity. Growth in the eastern half of Iowa will be constrained. The risk of losing network element stability is increased. The gateway is constructed using codec equipment that is eight to nine years old. This equipment is increasingly unstable. This fragile state will continue to decrease Network reliability. Optimum Network usage will not be achieved.

Resources: If the remaining $10,500,000 phase of the conversion is entirely funded in FY 2002 the expense for upgrading the old DS-3 equipment will be unnecessary. No other funding sources have been identified to complete this project.

SECTION 2: PROJECT PLAN

Individual project plans will vary depending upon the size and complexity of the project. A project plan includes the following information:

1. Agency Information

Project Executive Sponsor Responsibilities: Identify, in Section I, the executive who is the sponsor of the project. The sponsor must have the authority to ensure that adequate resources are available for the entire project, that there is commitment and support for the project, and that the organization will achieve successful project implementation.

Harold (Tommy) Thompson, Executive Director, ICN

Organization Skills: Identify the skills that are necessary for successful project implementation. Identify which of these skills are available within the agency and the source(s) and acquisition plan for the skills that are lacking.

The staff of ICN has the essential engineering and technical skills necessary for successful project implementation. This project is the completion of the remaining ATM rings. The ICN staff has gained expertise and efficiency during the installation of the first two rings. The project fielding has remained on schedule to this point.

2. Project Information

Mission, Goals, Objectives: The project plan should clearly demonstrate that the project has developed from an idea to a detailed plan of action. The project plan must link the project to an agency's mission, goals, and objectives and define project objectives and how they will be reached. The project plan should include the following:

ICN Mission Statement

To provide authorized users the highest quality and technologically advanced educational, medical, judicial, and governmental telecommunication services.

Goal 1: To operate the Network in an efficient and responsible manner providing the most economical service attainable to Network authorized users under established performance standards.

Goal 2: To achieve optimal utilization of the Network's facilities, by assuring that future growth requirements will be met, and that sufficient Network capacity is available to meet the needs of all users.

Goal 3: To provide essential advanced telecommunication service to all Network authorized users of Iowa.

A. **Expectations**: A description of the purpose or reason that the effort is being undertaken and the results that are anticipated.

The Part 3 installation of sites to the Network brought about the need for the ATM/MPEG-2 upgrade. The expansion of the number of video classrooms to over 720 has created an "overbuilt environment" for the backbone of the Network. This "overbuilt environment" is reflected in three ways:

- Uncontrolled blocking of video sessions at random sites. There are limited ports on the Grass Valley Switch. If the switches are overloaded uncontrolled blocking of video sessions at random sites will occur.
- Rationing video site usage. Inadequate trunk circuits between merged areas has already caused the ICN to begin rationing site usage and canceling some sessions due to a lack of available trunks for the requested connections. Many of these trunks are running in excess of 90% utilization. This high utilization rate means that video growth must be curtailed and capped at the current level unless the Network upgrade is completed. K-12 sites are just beginning to expand their use of the Network, and this restriction would reduce the value of the
  ICN as an educational tool. This inability to increase video use to it's full potential will require the State to continue the subsidization of video usage.
- Decrease in quality of video sessions. The ICN's current laser optics equipment has a seven-year lifespan. Much of the Network's equipment is in its seventh year. Manufacturer support is no longer available as this equipment has been discontinued. If the failure rates increase sharply, the Network staff will have no means to maintain the Network's operational status. This issue not only impacts the video users, but also adversely impacts the ICN's voice, Internet, and data services, which rely on the same optics for carrying traffic.

To date, the ICN has spent $12,500,000 on the ATM/MPEG-2 conversion. These funds have been used to complete the ATM/MPEG-2 deployment in the Southwest Iowa ring and will complete the Northwest Iowa ring in October 2000. The installation of the Cellworx equipment in Southeast Iowa is 100% complete. The ATM equipment that has been installed in the Southeast Iowa ring is not operational until the MPEG-2 video codecs are installed. Codecs are needed to light the fiber in the ring. If funding to continue the upgrade is not available, the state will have equipment installed on the Network that cannot be used. The one-year warranty on this installed equipment will have expired before the equipment is used, assuming the money will be available for the completion of the upgrade in FY2002. A portion of the codecs required for the final ring are already purchased and are currently in use at the gateway which merges the DS-3 platform with the MPEG-2 platform.

Completion of the upgrade will correct the three issues mentioned above, as well as ensure the availability of adequate bandwidth for the authorized user's future needs. This project clearly links to the ICN's mission and goals.

B. **Measures**: A description of the set of beliefs, tradeoffs and philosophies that govern the results of the project and their attainment. How is the project to be judged or valued? What criteria will be used to determine if the project is successful? What happens if the project fails?

ICN's enterprise goals are to provide authorized users the highest quality and technologically advanced telecommunication services. Converting the Network from DS-3 star-on-star topology to ATM will allow ICN to provide high quality video, voice, Internet, and data services. The benefits of the conversion are as follows:

- The ATM / MPEG-2 technology offers full redundancy of the Network. The current DS-3 platform does not offer full redundancy of video services. Under the old DS-3 technology, ICN utilizes alternate path routing under the star-on-star topology. ATM offers bi-directional light signals, which re-direct in the event of a failure. The ability to offer full redundancy provides greater Network reliability for authorized users.
- ATM also allows for decentralized scheduling. This provides the authorized users with greater flexibility in scheduling video sessions on the Network.
- ATM migration also allows for greater bandwidth utilization across the Network. ICN can deploy the concept of "bandwidth on demand." An endpoint will no longer have a dedicated circuit to its location, but rather will have a virtual circuit available for use. This virtual circuit will offer the ability for any one of a number of endpoints to access to the same circuit. Using this technique, the ICN will be able to meet the increasing service requests from our authorized users.

The success of this project is measured by the efficient operation of the Network and the ability to provide our authorized users with the high quality services they are requesting.

The ICN completed the conversion of the Southwest ring in May 2000. The Northwest ring will be completed October 2000. As we have ATM/MPEG-2 rings in operational status, we know from experience this technology functions in an effective manner. We have gained enough experience with the implementation process to ensure its success.

C. **Environment:** Who will provide input (e.g., businesses, other agencies, citizens) into the development of the solution? Are others creating similar or related projects? Are there cooperation opportunities?

Two studies have been completed which validate the architectural design of the ATM Network. The first study by Strategic Policy Research dated February 20, 1998 states:

> "Any significant growth in the number of sites served by the ICN will require an infrastructure change-out of the type contemplated by the ICN staff." " In such a scenario, migration to an ATM architecture is probably a sound choice." "The technology is increasingly stable, handles the statistical eccentricities of voice, data, and video with equal ease, and is more widely accepted in carrier back bones everyday."

The second study dated April 21, 1999 by Lucent Technologies states:

> "The current ICN infrastructure is not suitable for the continuously evolving Networking requirements of the ICN. We agree with ICN's decision to

implement ATM over SONET because of the large amount of video requirements and offers several features critical to successful delivery of quality video such as efficient use of bandwidth, dynamic routing, and quality of service guarantees." "We agree with ICN's plans and architecture for transitioning from the proprietary DS-3 solution to a standards based MPEG-2 solution. " "LUCENT agrees with the topology design."

The ICN has worked closely with Iowa's educational community to ensure the migration to ATM/MPEG-2 meets their needs for distance learning.

The ICN created close working relationships with the hardware and software manufacturers in the design and development of components that meet the Networks needs in providing quality services to our authorized users. These vendors include Todd Communications, ADC, Lucent Technologies, and Pathways.

Compliance with an enterprise technology standard: By upgrading the Network with MPEG-2 technology, the ICN meets telecommunications industry video standards. Meeting the standards of the International Telecommunication Union, which monitors industry standards for all industrialized nations, will ensure that the ICN will be able to connect with distance learning Networks in other states and nations, thus expanding the learning opportunities for Iowans. No national standards for video technology existed before 1996.

D. **Project Management and Risk Mitigation**: A description of how you plan to manage the project budget, project scope, vendors, contracts and business process change (if applicable). Describe how you plan to mitigate project risk.

The migration to ATM is a three-year process. Currently, we are into the second year of the conversion. The ICN is using Microsoft Project 98 as a tool for project management. The ATM team (including key staff members from Engineering, Operations, Administration, Asset Management, and Finance) meets on a weekly basis to ensure the project remains on track and within budget. Contact is maintained with the vendors on a weekly basis, if not more often. All necessary parts are on contract. We will continue to use this method as an effective means to managing the project.

The ICN schedules the conversions of the classrooms in a manner, which is the least disruptive to the schools. Our original schedule specified installation of the codecs during the summer months when schools are not in schedule. Delaying the deployment will hamper the installation process, as work will need to be scheduled around the schools usage of the Network.

The ATM migration will enable the ICN to change our business processes relating to billing as follows:

- Bill users based on the amount of bandwidth utilized by a site, including a monthly circuit.
- Bill either end users or host sites, depending on the host site's set up of the session.
- Bill authorized users for failures to cancel in accordance with Network standard operating procedures.

There is no means to mitigate the project risk if we do not receive funding. Risks include:

- The current switching system in the southeast ring, which includes the University of Iowa, is near its capacity due to the amount of traffic carried. It is vital that this ATM ring be completed as soon as possible. This old video switch is no longer manufactured.
- The aging laser optics, which are in, or past their seven-year shelf life. As the lasers age, there is a continued increase in their failure rate, lessening the reliability of the Network for ICN users. These optics have also been discontinued and are no longer supported by the manufacturer.
- During the transition period when both DS-3 and MPEG-2 technologies are used in the same environment the ICN is using a gateway to act as a back –to-back bridge. This allows the two technologies to communicate. The gateway handling this process is limited in the number of sites it can accommodate at one time.

This upgrade needs to be completed within the FY 2002. It is questionable whether the Network can be held together using the bridge and the aging optics for a period longer than that.

E. **Security / Data Integrity / Data Accuracy / Information Privacy**: A description of the security requirements of the project? How will these requirements be integrated into the project and tested. What measures will be taken to insure data integrity, data accuracy and information privacy?

The ICN has considered the Security, Data Integrity, Data Accuracy and Information Privacy requirements in the design of the Network upgrade project. These requirements are being addressed in the selection of ATM as the protocol being deployed. ATM allows for the establishment of Permanent Virtual Circuits (PVC's) to deliver Video, Voice and Data, including Internet services to the users of the network to insure the security, integrity and accuracy of the data is delivered to the destination intact.

The network management PVC's of the ATM Transport (Cellworx), Switches and codec equipment are Internet Protocol (IP) based and are protected by the same ICN Firewall devices that protects the State of Iowa Agencies IP networks from the outside world. These management PVC's are routed through a separate Router that is behind the Firewall.

3. Current Technology Environment (Describe the following):

A. **Software (Client Side / Server Side / Midrange / Mainframe)**

- Application software
- Operating system software
- Interfaces to other systems: Identify important or major interfaces to internal and external systems

B. **Hardware (Client Side / Server Side / Mid-range / Mainframe): Prior to the beginning of the ATM/MPEG-2 conversion**

- Platform, operating system, storage and physical environmental requirements.
  Laser optics are in or past their seven-year shelf life. Support and replacement parts are no longer available.
- Connectivity and Bandwidth: If applicable, describe logical and physical connectivity.
  DS3, star-on-star topology connection one point to many other secondary points, which are connected to many other third-order points. This point-to-point design only allows for one-way signal transmission. Bandwidth necessary for a classroom is 45 megabits.
- Interfaces to other systems: Identify important or major interfaces to internal and external systems.

  Before starting the conversion to ATM/MPEG-2, all video switching was handled by broadband video switches manufactured by Grass Valley Division of Tektronics, Inc. These switches were located at 15 merged areas, as well as one for the Des Moines metropolitan area and four at the hub. When the Network was designed, these were the only broadband video switches available that could handle a network as large as the ICN and provide the real-time switching functionality in timeframes that were required. The Grass Valley switch is still the only available switch that will handle the interactive DS-3 video switching on very large video networks such as the ICN. With the conversion of the Creston and Council Bluffs Merged Area Full Motion Interactive Distance Learning classrooms to MPEG-2 over ATM we have replaced the video switching functionality of the Grass Valley switches located in these merged areas. The deployment of the MPEG-2 codec in the Northwest Ring (Ring 1) will replace the switching functionality of the Grass Valley switches in the Sheldon, Sioux City, Estherville and Fort Dodge merged areas.

  Currently the ICN is operating in a “mixed environment” which includes ATM ring and switching, star-on-star, DS-3 codecs, MPEG-2 codecs. Completion of the ATM / MPEG-2 Conversion will eliminate this “mixed environment”.

4. Proposed Environment (Describe the following):

A. Software (Client Side / Server side / Mid-range / Mainframe)

- Application software.
  Necessary software is bundled with the codecs.
- Operating system software.
  ATM software has already been purchased and installed.
- Interfaces to other systems: Identify important or major interfaces to internal and external systems.
  Will interface to the existing FOTS room equipment currently located in the schools and libraries.
- General parameters if specific parameters are unknown or to be determined.

B. Hardware (Client Side / Server Side / Mid-range / Mainframe)

- Platform, operating system, storage and physical environmental requirements.
  The new equipment upgrades the Network through 2010 with a ten-year shelf life.

Codecs will be purchased so the Network can utilize the installed ATM ring for all services on the ring. The purchase will include:

Qty	Description	Part #	TOTAL
ADC Cellworx STN - Equipment Description			
32	Chassis with Air Baffles & Covers	STN-800000-000-A1	$196,268.80
30	OC-48 RIC 1310 optics Long Reach FC connector	STN-402000-233-A1	$486,720.00
14	OC-48 RIC 1550 optics Long Reach FC Connector	STN-402000-333-A1	$328,764.80
68	Shelf Controller	STN-201000-000-A1	$176,800.00
4	Network Mgmt. Interf. Controller (NMIC)	STN-202000-000-A1	$23,304.40
2	NMIC EIM	STN-302000-000-A1	$417.60
2	NIMIC Software Version 2.0.0 (Level 1 & 2 Features as well as OC-48 support)	STN-AC-2.0.0	$37,700.00
16	OC-3c MM LED 2 port	STN-100102-121-A2	$83,520.00
18	DS3 ATM CRS (UNI/NNI) 3 port	STN-100303-000-A2	$82,215.00
30	DSX3 EIM 3 port	STN-305030-000-A1	$5,846.40
8	DS3 Un-Structured (3 port)	STN-101003-000-A1	$42,456.00
4	OC-12c SM, LR UNI/NNI, 1 port (subtending)	STN-101301-333-A1	$56,376.00
7	OC-12c MM, SR UNI/NNI, 1 port (between chassis and to ATM switch)	STN-101301-121-A1	$40,600.00
18	OC-48 RIC 1310 optics Intermediate Reach FC connector	STN-402000-223-A1	$260,910.00
20	T-1 Multi 1 Circuit Emulation/Cell Relay- 16 Ports (EIM plus Cable)	STN-100616-000-A2	$114,724.00
Pathway Hardware and Software - Equipment Description			
30	7'x23" alum. Relay Rack	505-090-0344	$5,254.20
28	1- 50 Amp Dual Feed Fuse Panel and 2- 50 Amp Circuit Breakers	009-0004-1001/ cbk-009	$10,829.00
Far End Equipment			
436	Access Point ATM/MPEG-2 End Point (4 RU, DS3/OC-3 mm, IMAS Encoder/Decoder)	CDVPICN1-007	$6,588,013.00
35	AP MPEG-2 Coder & Decoder	CDVPVID-005 & 006	$465,150.00
440	8 Port T-1 Module (under development, estimated cost)	CDVPOCT-001	$1,729,300.00
644	Latency Issue Solution (sw/ hw and installation, estimate) each classroom	RLDU	$341,320.00
Installation - McLeod contract			
	Installation Hours - McLeod		$46,725.80
Vendor quantity discounts			
	Ring 2 & 3 Credit from ADC for multiple chassis for rings 2 & 3		($223,215.00)
400	R & D Credit (Codec Savings - $1,000 per unit for final 400 units)		($400,000.00)
	TOTAL		$10,500,000.00

This is the minimum essential equipment to make the ring operational for Video, Voice, Internet, and Data services. It is critical to allow for a complete conversion of the ring.

- Connectivity and Bandwidth: If applicable, describe logical and physical connectivity.

Ring topology with two-way optics is already in place using existing fiber. DS-3 connections will connect the codecs to the endpoints. Classrooms will connect to ATM switches for transport of

the video signal. ATM creates a virtual bandwidth pipe with no need for reserved capacity. Logical connections will be built around the ring. Bandwidth necessary for a classroom is reduced to 11 megabits. ATM simplifies the Network by eliminating 16 regeneration sites.

- Interfaces to other systems: Identify important or major interfaces to internal and external systems.

Internal: Will interface to the existing FOTS room equipment currently located in the schools and libraries.
Interfaces will also be made to the hub switches and servers at key locations. The ring topology is designed to have presence at major hub locations so multiple rings can interface with major switches / servers.

External: The ICN will have a presence at the major Part 1 and Part 2 sites, which will be able to interface with outside telecommunication providers.

- General parameters if specific parameters are unknown or to be determined.

Specific parameters are in use and have been installed in 2 of the 5 rings.

Data Elements: If the project creates a new database the project plan should include the specific software involved and a general description of the data elements.
Not applicable to this project.

Project Schedule: A schedule that includes: time lines, resources, tasks, checkpoints, deliverables and responsible parties.

A general schedule for the entire project is summarized as follows:

Ring 5 (SW)
Operational May, 2000.

Ring 1 (NW)
Cellworx installation completed
MPEG-2 codec installation and testing July-Oct 15, 2000

Ring 4 (SE)
Cellworx installation currently 40% complete - final completion in FY02
MPEG-2 codec installation – FY02

Ring 2 & 3 (NC & NE)
Complete in FY 02

There are six major tasks involved in the installation of the codec at each site:

1. Preparation of the work order detail – this is completed in ICN Engineering.
2. ICN Asset Management completes transport of equipment. The equipment is pulled from inventory and shipped to the site.
3. Installation of equipment –performed by contract technicians who are coordinated by the ICN Operations division.

4. Site turn up – performed by contract technicians, coordinated by the ICN Operations division
5. Site Cutover: performed by contract technicians, coordinated by the ICN Operations division
6. Remove Sonet equipment – equipment is pulled by contract technicians. ICN Asset Management is responsible for making the arrangements for the return of the old equipment to inventory for use as repair parts during the final phase of the conversion.

SECTION 3: Return On Investment (ROI) Financial Analysis

Project Budget:

Provide the estimated project cost by expense category.

Personnel	$_____
Software	$_____
Hardware	$ 10,453,275
Training	$_____
Facilities	$_____
Professional Services	$_____
Supplies	$_____
Other (Specify)…Installation…	$ 46,725
Total	$ 10,500,000

As this project evaluation is only looking at a portion of a much larger project, equipment costs only have been used in the financial analysis portion of this document.

Project Funding:

Provide the estimated project cost by funding source.

State Funds	$ 10,500,000	.....	100% of total cost
Federal Funds	$_____	.....	_____ % of total cost
Local Gov. Funds	$_____	.....	_____ % of total cost
Private Funds	$_____	.....	_____ % of total cost
Other Funds (Specify)	$_____	.....	_____ % of total cost
Total Cost:	$ 10,500,000		100% of total cost

How much of the cost would be incurred by your agency from normal operating budgets (equipment only)? ..... $_____ _____%

How much of the cost would be paid by "requested IT project funding"? .. $ 10,500,000 100%

Provide the estimated project cost by fiscal year: FY00 $ 9,000,000 (Completed)

FY01 $ 3,500,000 (Completed)

FY02 $ 10,500,000 (This project Request)

ROI Financial Worksheet Directions (Attach Written Detail as Requested):

Annual Pre-Project Cost -- Quantify, in written detail, all actual State government direct and indirect costs (personnel, support, equipment, etc.) associated with the activity, system or process prior to project implementation. This section should be completed only if State government costs are expected to be reduced as a result of project implementation.

Annual Post-Project Cost -- Quantify, in written detail, all estimated State government direct and indirect costs associated with activity, system or process after project implementation. This section should be completed only if State government costs are expected to be reduced as a result of project implementation.

State Government Benefit -- Subtract the total "Annual Post-Project Cost" from the total "Annual Pre-Project Cost." This section should be completed only if State government costs are expected to be reduced as a result of project implementation.

Citizen Benefit -- Quantify, in written detail, the estimated annual value of the project to Iowa citizens. This includes the "hard cost" value of avoiding expenses (hidden taxes) related to conducting business with State government. These expenses may be of a personal or business nature. They could be related to transportation, the time expended on or waiting for the manual processing of governmental paperwork such as licenses or applications, taking time off work, mailing, or other similar expenses.

Opportunity Value/Risk or Loss Avoidance Benefit -- Quantify, in written detail, the estimated annual benefit to Iowa citizens or to State government. This could include such items as qualifying for additional matching funds, avoiding the loss of matching funds, avoiding program penalties/sanctions or interest charges, avoiding risks to health/security/safety, avoiding the consequences of not complying with State or federal laws, providing enhanced services, avoiding the consequences of not complying with enterprise technology standards, etc.

Total Annual Project Benefit -- Add the values of all annual benefit categories.

Total Annual Project Cost -- Quantify, in written detail, the estimated annual new cost necessary to implement and maintain the project including consulting fees, equipment retirement, ongoing expenses (i.e. labor, etc.), other technology (hardware, software and development), and any other specifically identifiable project related expense. In general, to calculate the annual hardware cost, divide the hardware and associated costs by three (3), the useful life. In general, to calculate the annual software cost, divide the software and associated costs by four (4), the useful life. This may require assigning consulting fees to hardware cost or to software cost. A different useful life may be used if it can be documented.

Benefit / Cost Ratio – Divide the "Total Annual Project Benefit" by the "Total Annual Project Cost." If the resulting figure is greater than one (1.00), then the annual project benefits exceed the annual

project cost. If the resulting figure is less than one (1.00), then the annual project benefits are less than the annual project cost.

ROI -- Subtract the "Total Annual Project Cost" from the "Total Annual Project Benefit" and divide by the amount of the project funds requested.

Benefits Not Cost Related or Quantifiable -- List the project benefits and articulate, in written detail, why they (IT innovation, unique system application, utilization of new technology, hidden taxes, improving the quality of life, reducing the government hassle factor, meeting a strategic goal, etc.) are not cost related or quantifiable. Rate the importance of these benefits on a "1 – 10" basis, with "10" being of highest importance. Check the "Benefits Not Cost Related or Quantifiable" box in the applicable row.

ROI Financial Worksheet

***** A 10 year useful life has been assumed for all ATM / MPEG2 equipment in the following calculations*****

Annual Pre-Project Cost - How You Perform The Function(s) Now	
FTE Cost (salary plus benefits):	
Support Cost (i.e. office supplies, telephone, pagers, travel, etc.):	
Other Cost (expense items other than FTEs & support costs, i.e. indirect costs if applicable, etc.):	
A. Total Annual Pre-Project Cost:	**N/A – Operational costs will remain constant.**
Annual Post-Project Cost – How You Propose to Perform the Function(s)	
FTE Cost:	
Support Cost (i.e. office supplies, telephone, pagers, travel, etc.):	
Other Cost (expense items other than FTEs & support costs, i.e. indirect costs if applicable, etc.):	
B. Total Annual Post-Project Cost:	
State Government Benefit (= A-B):	**N/A – Operational costs will remain constant.**
Annual Benefit Summary	
State Government Benefit:	
Citizen Benefit (including quantifiable "hidden taxes"):	
Opportunity Value and Risk/Loss Avoidance Benefit: Equipment necessary to keep Network Operating Under Current Configuration **Install used, obsolete or discontinued equipment to keep the Network running. This equipment is not supported by the manufacturer.** **Required update to keep ring functional beyond FY01 – useful only until completion of conversion (1 year)**	**Add DS-3 & Switching** **no longer available** **Optics Replacements** **no longer available** **Video Hub Replacement** **no longer available** **OC48 TSS Transport System software** **300,000**

Required update to keep ring functional beyond Y01 – useful only until completion of conversion (1 year)	**OC12 Upgrade**	**3,284,420**
Required update to keep ring functional beyond Y01 – useful only until completion of conversion (1 year)	**Alcatel 1631 SX Digital Cross Connect System**	**759,234**
TM Video Switches Already Purchased for this Ring		
C. Total Annual Project Benefit:		**$4,343,654**
D. Total Annual Project Cost:		**$1,050,000**
Benefit / Cost Ratio (C / D):	**4.14**	
ROI (C – D / Project Funds Requested):	**94.10%**	

Benefits Not Cost Related or Quantifiable (including non-quantifiable "hidden taxes")

1. The state of Iowa will retain its role as a world-renowned leader in distance learning technology. Rating: 8
2. Supports the telecommunications standard codec for video. Rating: 10
3. Reduced classroom bandwidth need from 45 to 11 megabits. Rating: 9
4. Creates a virtual bandwidth pipe with no reserved capacity. Rating: 9
5. Redundancy to support telemedicine, judicial, government, and education. Rating: 10
6. Expanded video switch capabilities to meet site needs. Rating: 10
7. Upgrades the Network through 2010. Rating: 10
8. Eliminates uncontrolled blocking of classrooms due to switch limitations. Rating: 10
9. Ability to continue providing the authorized users reliable, high quality service. Rating: 10
10. Replacement equipment for the old DS-3 Sonet network is no longer available. Equipment costs used in above calculation are from 1997, the last year the components were manufactured. Network maintenance is performed with components removed from areas which have been converted to ATM / MPEG-2 technology. With the aging optics and the lack of replacement parts the future of the network is in jeopardy. Continuation of this conversion will keep the ICN operational and allow the ICN to meet the current and future needs of the authorized users. Rating: 10
11. Ability to provide equal access to distance learning, telemedicine, judicial and government services to the citizens in rural and urban areas of the state at a low cost. Rating: 10
12. Increases the spending power of taxpayer dollars by optimizing the use of the backbone capacity of the Network in the delivery of services to the citizens of Iowa. Rating: 10